64. The apparatus according to claim 59, wherein each of said waveguides comprises tuning means for tuning an electromagnetic wave.

65. The apparatus according to claim 58, wherein an electromagnetic wave introduced from said waveguide is a microwave.

All

66. (Amended) The apparatus according to claim 58, wherein the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of the inert gas and F_2 gas.

REMARKS

In view of the above amendments and the following remarks, Applicants request favorable reconsideration and allowance of the above-identified application.

Claims 4-53, 55 and 57-108 are now pending in this application. Claims 67-108 have been withdrawn from consideration. Of the claims still under consideration, Claims 4, 19, 22, 25, 31, 35, 37, 42, 50, 53 and 58 are independent. By this Amendment, Applicants have canceled Claims 1-3, 54 and 56, and amended Claims 4, 9, 10, 18, 19, 21-31, 34-38, 41-43, 47, 48, 50, 52, 53, 55, 57-62 and 66.

The Office Action requests that Figures 56A, 56B and 57 be designated as "Prior Art". Applicants submit that those figures, while showing recent developments in the area of laser oscillating apparatuses, do not necessarily qualify as prior art against the

subject matter of the present invention. Accordingly, Applicants request withdrawal of the requirement to label those figures as "Prior Art".

Claims 1-66 stand rejected under 35 U.S.C. § 112, second paragraph, as being incomplete for failing to recite a cooperative relationship with the uniformizing means. Applicants have amended the claims to remove that feature, rendering the rejection moot. Accordingly, Applicants request withdrawal of the rejection under 35 U.S.C. § 112, second paragraph.

Claims 1-23, 25-62 and 64-66 stand rejected under 35 U.S.C. § 102(e) over U.S. Patent No. 6,331,994 (Ohmi, et al.). Applicants traverse this rejection.

As recited in independent Claim 4, Applicants' invention is directed to a laser oscillating apparatus in which slots are spaced apart from a wall of a laser tube by a predetermined distance and an electromagnetic wave passage is formed in a position spacing the slots apart from the laser tube and connects the slots to the laser tube such that electromagnetic waves introduced from the plurality of slots overlap with each other.

As recited in independent Claim 19, Applicants' invention is directed to a laser oscillating apparatus in which the width of longitudinal end portions of slots are made larger than the width of a central portion thereof.

As recited in independent Claim 22, Applicants' invention is directed to a laser oscillating apparatus in which slots are formed apart from a central axis along a longitudinal direction of a waveguide and each of the slots is curved such that end portions are closer to the central axis than a central portion.

As recited in independent Claim 25, Applicants' invention is directed to a laser oscillating apparatus in which an air-gap structure is formed in a waveguide wall in which slots are formed.

As recited in independent Claim 31, Applicants' invention is directed to a laser oscillating apparatus in which each of a plurality of slots comprises collecting means for guiding an electromagnetic wave to the slot.

As recited in independent Claim 35, Applicants' invention is directed to a laser oscillating apparatus in which the width of end portions in a longitudinal direction of each of a plurality of slots is made smaller than the width of a central portion thereof.

As recited in independent Claim 37, Applicants' invention is directed to a laser oscillating apparatus in which slots are formed in a portion where an emission characteristic of an electromagnetic wave depending on the slots is contrary to an intensity distribution of an electromagnetic wave propagating in a waveguide.

As recited in independent Claim 42, Applicants' invention is directed to a laser oscillating apparatus having a shielding structure for shielding against electromagnetic waves in a laser tube in order to prevent plasma excited above a plurality of slots from diffusing from a predetermined region.

As recited in independent Claim 50, Applicants' invention is directed to a laser oscillating apparatus in which the width in a short-side direction of each of a plurality of slots is made smaller than a thickness of a sheet serving as a passage of electromagnetic waves extending from an opening of each of the slots in a short-side direction.

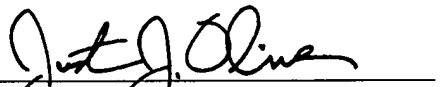
As recited in independent Claim 53, Applicants' invention is directed to a laser oscillating apparatus in which the width in the short-side direction of each of a plurality of slots is made smaller than the thickness of a sheath serving as a passage of electromagnetic waves in the short-side direction, and a plurality of slots are arranged in the short-side direction.

As recited in independent Claim 58, Applicants' invention is directed to a laser oscillating apparatus in which a pair of waveguides sandwich a laser tube such that surfaces of the waveguides having slots formed therein oppose each other, identical electromagnetic waves are supplied to the pair of waveguides to excite a laser gas in two opposite directions in the laser tube, and the pair of waveguides are constructed such that intensity distributions of electromagnetic waves introduced therefrom are shifted from each other.

The Ohmi, et al. patent is directed to an excimer laser oscillation apparatus. Applicants submit the Ohmi, et al. patent fails to specifically disclose any one of the above-discussed features of the present invention recited in the independent claims. Accordingly, Applicants requests withdrawal of the rejection under 35 U.S.C. § 102(e).

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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VERSIONS WITH MARKINGS TO SHOW
CHANGES MADE TO THE CLAIMS

4. (Amended) [The apparatus according to claim 1,] A laser oscillating apparatus for generating a laser beam comprising:

a laser tube which is filled with a laser gas; and

a waveguide which has a plurality of slots formed in a waveguide wall and introduces electromagnetic waves into said laser tube through said slots,

wherein [said uniformizing means is formed such that] said slots are spaced apart from a wall of said laser tube by a predetermined distance and an electromagnetic wave passage is formed in a [portion] position spacing said slots apart from said laser tube and connects said slots to said laser tube such that electromagnetic waves introduced from said plurality of slots can overlap with each other.

9. (Amended) The apparatus according to claim 8, wherein said air gap is filled with [a] at least one dielectric member.

10. (Amended) The apparatus according to claim 9, [wherein said dielectric member comprises] further comprising a plurality of dielectric members having different dielectric constants.

18. (Amended) The apparatus according to claim 4, wherein [said] the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of [said] the inert gas and F_2 gas.

19. (Amended) [The apparatus according to claim 1, wherein said uniformizing means is formed such that] A laser oscillating apparatus for generating a laser beam comprising:

a laser tube which is filled with a laser gas; and

a waveguide which has a plurality of slots formed in a waveguide wall and introduces electromagnetic waves into said laser tube through said slots,

wherein the width of longitudinal end portions of said [slot is] slots are made larger than the width of a central portion thereof.

21. (Amended) The apparatus according to claim 19, wherein [said] the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of [said] the inert gas and F_2 gas.

22. (Amended) [The apparatus according to claim 1, wherein said uniformizing means is formed such that] A laser oscillating apparatus for generating a laser beam comprising:

a laser tube which is filled with a laser gas; and

a waveguide which has a plurality of slots formed in a waveguide wall and introduces electromagnetic waves into said laser tube through said slots,

wherein said slots are formed apart from a central axis along a longitudinal direction of said waveguide and each of said slots is curved such that end portions are closer to the central axis than a central portion.

23. (Amended) The apparatus according to claim 22, wherein said electromagnetic [wave is] waves are radiated from said waveguide in the direction of a long end face of said waveguide.

24. (Amended) The apparatus according to claim 22, wherein [said] the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of [said] the inert gas and F_2 gas.

25. (Amended) [The apparatus according to claim 1, wherein said uniformizing means is formed such that] A laser oscillating apparatus for generating a laser beam comprising:

a laser tube which is filled with a laser gas; and

a waveguide which has a plurality of slots formed in a waveguide wall and introduces electromagnetic waves into said laser tube through said slots,

wherein an air-gap structure is formed in said waveguide wall in which said slots are formed.

26. (Amended) The apparatus according to claim 25, wherein said air-gap structure includes an air-gap portion formed near end portions of said [slot] slots within a range from said end portions to a distance of $\lambda g/4$ (λg is the waveguide wavelength of [said] the electromagnetic wave).

27. (Amended) The apparatus according to claim [25,wherein] 25, wherein said air-gap structure includes an air-gap portion formed near end portions of said [slot] slots within a range from said end portions to a distance of $\lambda g/2$ (λg is the waveguide wavelength of [said] the electromagnetic wave).

28. (Amended) The apparatus according to claim 25, wherein an air-gap portion of said air-gap structure in a central portion of one of said [slot] slots is made smaller than an air-gap portion near end portions of said slot.

29. (Amended) The apparatus according to claim 25, wherein in a direction perpendicular to a longitudinal direction of said [slot,] slots, said air-gap structure is formed with a width equal to an integral multiple of $\lambda g/2$ (λg is the waveguide wavelength of [said] the electromagnetic wave).

30. (Amended) The apparatus according to claim 25, wherein [said] the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of [said] the inert gas and F_2 gas.

31. (Amended) [The apparatus according to claim 1, wherein said uniformizing means is formed such that] A laser oscillating apparatus for generating a laser beam comprising:

a laser tube which is filled with a laser gas; and

a waveguide which has a plurality of slots formed in a waveguide wall and introduces electromagnetic waves into said laser tube through said slots,

wherein each of said plurality of slots comprises collecting means for [efficiently] guiding [said] the electromagnetic wave to said slot.

34. (Amended) The apparatus according to claim 31, wherein [said] the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of [said] the inert gas and F_2 gas.

35. (Amended) [The apparatus according to claim 1, wherein said uniformizing means is formed such that] A laser oscillating apparatus for generating a laser beam comprising:

a laser tube which is filled with a laser gas; and

a waveguide which has a plurality of slots formed in a waveguide wall and introduces electromagnetic waves into said laser tube through said slots,

wherein the width of end portions in a longitudinal direction of each of said [slot] slots is made smaller than the width of a central portion thereof.

36. (Amended) The apparatus according to claim 35, wherein [said] the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of [said] the inert gas and F_2 gas.

37. (Amended) [The apparatus according to claim 1, wherein said uniformizing means is formed such that] A laser oscillating apparatus for generating a laser beam comprising:

a laser tube which is filled with a laser gas; and

a waveguide which has a plurality of slots formed in a waveguide wall and introduces electromagnetic waves into said laser tube through said slots,

wherein said [slot is] slots are formed in a portion where an emission characteristic of an electromagnetic wave depending on said [slot] slots is contrary to an intensity distribution of an electromagnetic wave propagating in said waveguide.

38. (Amended) The apparatus according to claim 37, wherein at least one of said [slot] slots is formed such that a minimum value of an intensity distribution of an

electromagnetic wave propagating in said waveguide is in substantially the center of said slot.

41. (Amended) The apparatus according to claim 37, wherein [said] the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of [said] the inert gas and F_2 gas.

42. (Amended) [The apparatus according to claim 1, wherein said uniformizing means comprises] A laser oscillating apparatus for generating a laser beam comprising:

a laser tube which is filled with a laser gas;

a waveguide which has a plurality of slots formed in a waveguide wall and introduces electromagnetic waves into said laser tube through said slots; and

a shielding structure for shielding against [said] the electromagnetic [wave] waves in said laser tube in order to prevent [said] plasma excited above said slots from diffusing from a predetermined region.

43. (Amended) The apparatus according to claim 42, wherein said shielding structure is formed to prevent diffusion of [said] the electromagnetic wave in a direction perpendicular to a longitudinal direction of said slots.

47. (Amended) The apparatus according to claim 46, wherein said nozzle is a passage of [said] the laser gas.

48. (Amended) The apparatus according to claim [41] 42, wherein said shielding structure is formed by a magnetic field.

49. (Amended) The apparatus according to claim 42, wherein [said] the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of [said] the inert gas and F_2 gas.

50. (Amended) [The apparatus according to claim 1, wherein said uniformizing means is formed such that] A laser oscillating apparatus for generating a laser beam comprising:

a laser tube which is filled with a laser gas; and

a waveguide which has a plurality of slots formed in a waveguide wall and introduces electromagnetic waves into said laser tube through said slots,

wherein the width in a short-side direction of each of said [slot] slots is made smaller than the thickness of a sheath serving as a passage of [said] the electromagnetic [wave] waves extending from an opening of each of said [slot] slots in said short-side direction.

52. (Amended) The apparatus according to claim 50, wherein [said] the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of [said] the inert gas and F_2 gas.

53. (Amended) [The apparatus according to claim 1, wherein said uniformizing means is formed such that] A laser oscillating apparatus for generating a laser beam comprising:

a laser tube which is filled with a laser gas; and

a waveguide which has a plurality of slots formed in a waveguide wall and introduces electromagnetic waves into said laser tube through said slots,

wherein the width in the short-side direction of each of said slots [comprises a plurality of rows of slits, and the width of each slit] is made smaller than the thickness of a sheath serving as a passage of [said] the electromagnetic [wave] waves in the short-side direction, and a plurality of slots are arranged in the short-side direction.

55. (Amended) The apparatus according to claim [54] 53, wherein a shielding structure for suppressing diffusion of said plasma is formed laterally at an opening edge of one of said [slot] slots facing said laser tube.

57. (Amended) The apparatus according to claim 53, wherein [said] the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of [said] the inert gas and F_2 gas.

58. (Amended) [The apparatus according to claim 1, wherein said uniformizing means is formed such that] A laser oscillating apparatus for generating a laser beam comprising:

a laser tube which is filled with a laser gas; and

a pair of waveguides, each of which has a plurality of slots formed in a waveguide wall and introduces electromagnetic waves into said laser tube through said slots,

[a] wherein said pair of waveguides [are formed to] sandwich said laser tube such that [formation] surfaces of said waveguides having said slots oppose each other, identical electromagnetic waves are supplied to said pair of waveguides to excite a laser gas in two opposite directions in said laser tube, and said pair of waveguides are constructed such that intensity distributions of electromagnetic waves introduced therefrom are shifted from each other.

59. (Amended) The apparatus according to claim 58, wherein the [formation] surfaces [of] having said slots are short end faces of said waveguides, and said slots are formed in a line at equal intervals in a longitudinal direction of said slots.

60. (Amended) The apparatus according to claim 59, wherein said waveguides are arranged such that slots corresponding to each other between the opposing [formation] surfaces are shifted relative to each other by a predetermined distance.

61. (Amended) The apparatus according to claim 60, wherein said slots are formed at a pitch equal to half of a wavelength in said waveguides, and [said] the predetermined distance is 1/4 of [said] the wavelength.

62. (Amended) The apparatus according to claim 60, wherein said slots are formed at a pitch equal to one wavelength in said waveguides, and [said] the predetermined distance is half of said wavelength.

66. (Amended) The apparatus according to claim 58, wherein [said] the laser gas is one of at least one inert gas selected from the group consisting of Kr, Ar, He and Ne, and a gas mixture of [said] the inert gas and F_2 gas.